State of California
Department of Pesticide Regulation
Pesticide Registration Branch
PR-REG-003 (Est. 7/91) (Rev. 7/11)

APPLICATION
FOR SECTION 18 EMERGENCY EXEMPTION

The following information is required for an emergency exemption request based on the revised United States Environmental Protection Agency (USEPA) Code of Federal Regulations, Title 40, Part 166 concerning Section 18 requests. Requests which are incomplete will be denied by the USEPA without review. In order to comply with these requirements, the information listed below must be provided. **Use additional pages if necessary.** Please note that the more complete the questionnaire, the better your chances are of obtaining the exemption.

☐ **Check box if this is a reissuance request.** Year 2018 ID # EE-283094

TYPE OF EXEMPTION BEING REQUESTED (check one)

☒ SPECIFIC

☐ QUARANTINE

☐ PUBLIC HEALTH

DESCRIPTION OF PESTICIDE REQUESTED

Common Chemical Name (Active Ingredient): Sulfoxaflor

Trade Name/Brand Name: Sequoia Insecticide

U.S. EPA Reg. No.: 62719-623

Formulation: Suspension Concentrate (SC) % Active Ingredient: 21.8%

Manufacturer: Dow AgroSciences, LLC

APPLICANT, STATE CONTACT PERSON, AND QUALIFIED EXPERT(S)

APPLICANT

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QUALIFIED EXPERT(S)

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DESCRIPTION OF PROPOSED USE

Sites to be Treated (i.e. crops, structures, etc.): Strawberry

Statewide or County Specific (list counties): Fresno, Madera, Merced, Los Angeles, Monterey, Orange, Sacramento, San Benito, San Diego, San Luis Obispo, Santa Barbara, Santa Clara, Santa Cruz, and Ventura Counties

Method of Application: Foliar applications made by ground equipment

Rate of Application (in terms of a.i. and product):
Apply 2.75 - 4.50 ounces of product (0.043-0.07 lbs. a.i.) per acre per application

Frequency/Timing of Application: Applications may not begin before 7 pm and must be completed by 3 am.

Allow a minimum of 7 days between applications

Treat in accordance with local economic thresholds. Consult your Dow AgroSciences representative, cooperative extension service, certified crop advisor, or state agricultural experiment station for any additional local use recommendations for your area.

Use higher rate in the rate range for heavy pest populations.

Maximum Number of Applications: Two Applications

Total Acreage Planted and to be Treated: 33,791 Planted
28,000 Treated

Total Amount of Pesticide to be used (in terms of product and a.i.):
15,750 pounds of Sequoia Insecticide
3,920 pounds of Sulfoxaflor

Use Season:

Date first application needed: September 15, 2018

Date last application needed: September 15, 2019

Restricted Entry Interval (REI): 24 hours

Preharvest Interval (PHI): 1 day

Earliest Harvest Date:
Orange County: January – May
Oxnard: January to July and September to January
Santa Maria: February – December
Watsonville/Salinas: March – November

Additional Restrictions, User Precautions and Requirements, Qualifications of Applicators, etc.:

- Applications may not begin before 7 p.m. and must be completed by 3 a.m.
- A copy of the Section 18 Use Instructions (label) must be in the possession of the user at the time of application in California (**Attachment A**).
- Follow all applicable restrictions, directions, and precautions on the U.S. EPA registered label for Transform WG Insecticide (**Attachment B**).
- The California Department of Pesticide Regulation (DPR) must be immediately informed of any adverse effects that may result from the use of Transform WG Insecticide in Cotton.
- Use of this product may pose a hazard to endangered or threatened species. Before applying this product, applicators must obtain information regarding the proximity of endangered species habitats and follow any applicable use limitations. Contact your County Agricultural Commissioner or refer to the Department of Pesticide Regulation's PRESCRIBE Internet Database: http://www.cdpr.ca.gov/docs/endspec/prescint.htm for details

EXPECTED RESIDUE LEVELS IN FOOD

Applications made in accordance with the above provisions are not expected to result in combined residues of sulfoxaflor, including its metabolites and degradates, in or on strawberries (Berry, low growing, subgroup 13-7G) in excess of 0.70 ppm. The Environmental Protection Agency has determined that these levels are adequate to protect the public health and have been established in 40CFR at 180.668(a).

ALTERNATIVE METHODS OF CONTROL

For control of lygus, strawberry growers are faced with a limited number of effective products. The UC Pest Management guidelines state that insecticidal sprays must be timed to kill the earliest instars of nymphs, because the majority of registered insecticides are not very effective on adults. The guide also points out that the number of treatments for lygus must be limited, because most of the materials that are effective against lygus disrupt natural enemies of spider mites. To further complicate control measures, growers need access to products with short preharvest intervals and restricted entry intervals, because strawberries are harvested on a three day cycle during peak production.

While registered materials do work under low to moderate pressure, the huge population densities being experienced in strawberry fields during the last three years have been exceptional. Lygus bugs are out of control and a very serious problem in strawberry. The current populations have overwhelmed alternatives, and after treatment with the available alternative pesticides, Lygus population densities are still well above economic threshold. (Mark Bolda, Cooperative Extension Scientist)

Registered Alternative Pesticides:

Beleaf (flonicamid): Flonicamid is an excellent choice for efficacy and selectivity and it controls all life stages of Lygus. Flonicamid is currently the most efficacious alternative insecticide available to strawberry growers for controlling Lygus; however, reliance on a single active ingredient puts undue selection pressure on the Lygus population. Additionally, utilizing Beleaf is met with the restriction of three applications per season. The label for flonicamid allows three applications a year spaced three weeks apart. This restriction allows growers to only have effective control measures 9 weeks out of the 24 week long season (Mark Bolda 2018). Because the growers are limited on available effective insecticides, rotating materials to avoid resistance development is difficult. When growers switch to a less effective material, lygus populations are left to increase to numbers above the treatment threshold (Mark Bolda 2018).

Rimon (novaluron): Novaluron is a chiton synthesis inhibitor and affects the molting process of the larvae. As a result, novaluron is most effective on first two nymphal instars, and has no effect on adult lygus bugs. The number of novaluron applications is limited to three per year, and the label recommends that growers apply the product in paired applications at an interval of 7 – 10 days. This recommendation limits the use of Rimon to twice per season (paired application + single application), which will not provide season long control of the three to four Lygus hatches.

Danitol 2.4 EC (fenpropathrin):): Synthetic pyrethroids were traditionally the most effective materials currently registered for Lygus bug control in strawberries; however, Lygus resistance to pyrethroids is rendering the insecticides ineffective in several growing regions. Pyrethroids are broad spectrum insecticides and multiple applications in individual fields have resulted in secondary outbreaks of mites due to a reduction in natural enemies. The UC IPM guidelines state the use of this material is restricted to two applications per season and applications should target the summer generations of lygus in areas where fruit is produced throughout the summer. The

guide also states only two applications of any pyrethroid insecticide should be made to the crop each year to prevent further resistance development. Please see **Attachment C** for the results discussing resistance assays. Furthermore, pyrethroids are continuously evaluated by DPR for sediment runoff into surface water, and are currently under ecological review at the U.S. EPA.

Brigade WSB (bifenthrin): Synthetic pyrethroids were traditionally the most effective materials currently registered for Lygus bug control in strawberries; however, Lygus resistance to pyrethroids is rendering the insecticides ineffective in several growing regions. Additionally, pyrethroids are broad spectrum insecticides and multiple applications in individual fields have resulted in secondary outbreaks of mites due to a reduction in natural enemies. The UC IPM guidelines state the use of this material is restricted to two applications per season and applications should target the summer generations of lygus in areas where fruit is produced throughout the summer. The guide also states only two applications of any pyrethroid insecticide should be made to the crop each year to prevent further resistance development. Furthermore, pyrethroids are continuously evaluated by DPR for sediment runoff into surface water, and are currently under ecological review at the U.S. EPA.

Dibrom 8E + Actara (Naled and Thiamethoxam): Naled is an organophosphate and is not effective in several growing regions due to resistance development. Growers are recommended not to apply Dibrom when temperatures reach over 90 degrees Fahrenheit. Furthermore, naled is not compatible with any biological control program.

Assail 70 WP (Acetamiprid): Acetamiprid provides better control of nymphs than adults. Acetamiprid can be tank mixed with fenpropathrin or bifenthrin. The IPM guidelines caution to reserve tank mixing for areas that acetamiprid is not effective by itself due to the high risk of the development of insecticide resistance by lygus, aphids, and whiteflies.

Actara (Thiamethoxam): Thiamethoxam provides better control of nymphs than adults. Thiamethoxam can be tank mixed with fenpropathrin or bifenthrin. The IPM guidelines caution to reserve tank mixing for areas that thiamethoxam is not effective by itself due to the high risk of the development of insecticide resistance by lygus, aphids, and whiteflies. Furthermore, there are serious concerns with the neonicotinoid class of chemistry and bee safety. Please see **Attachment C** for the results discussing resistance assays.

Dibrom 8 EC (naled): Naled is an organophosphate and is not effective in several growing regions due to resistance development. Growers are recommended not to apply naled when temperatures reach over 90 degrees Fahrenheit. Furthermore, naled is not compatible with any biological control program.

Malathion: Malathion is only effective against the first three nymphal instars. Additionally, a high level of resistance development in Lygus has been identified in several growing regions. Please see **Attachment C** for the results discussing resistance assays.

M-Pede (insecticidal Soap): The potential for phytotoxicity from M-Pede has not been fully evaluated. The IPM guidelines state, "To reduce the risk of phytotoxicity, do not exceed one application a month or two applications per season."

Control Practices:

Weed Control:

Weed management, when possible, is utilized as a way to help mitigate Lygus pest pressures. Overwintering Lygus bugs lay eggs in weeds in January, and the eggs begin to hatch in March. Weed control measures in March and early April, while Lygus are still nymphs, is critical. Once adults are present on weeds, they will migrate into strawberries once the surrounding weeds have dried out.

Although growers follow weed management guidelines, the weed management needed to help suppress Lygus populations is out of the hands of the grower experiencing the pest pressures. Areas surrounding strawberry fields including right of ways, highways, or "natural areas" are overseen by respective county, state or federal agencies, not the growers. It is simply not economically justifiable for county agencies to spend the manpower and fuel to manage areas on a case-by-case instance relative to strawberry producing areas.

Vacuuming:

The Strawberry Commission has worked over five years to improve the effectiveness of commercial bug vacuum designs. In order for vacuuming to be effective, the bugs need to be pulled of the plant and then killed by the action of vacuuming. From work performed in 2013, the Commission discovered that vacuuming efficacy was incredibly variable between vacuums and there were no standard operating procedures for the vacuums. After this discovery, several modifications were made and recommended operating procedures were created; as a result, the efficacy was increased from 2.5 percent to 15-18 percent. (Thomas 2014)

Unfortunately, lygus is not adequately controlled even with many growers using bug vacuums twice a week for most of the season in addition to using the full array of insecticides available. The current vacuum program used by the strawberry industry is two passes per week with some variation, due to production and maintenance schedules. Cost of the equipment, maintenance, gas, and labor to run the vacuum are significant for growers. According to Jean-Mari Peltier, President Environmental Solutions Group, the cost to vacuum twice per week is over $500 per acre per season.

Cover Crops:

Organic growers have had great success using alfalfa trap crops and beneficial insects.
From an article written by Charlie Pickett, CDFA scientist, organic growers are interplanting alfalfa within a strawberry field (trap cropping). Alfalfa is compatible with strawberry production, and is the choice crop for the Lygus. The trap crops become concentrated with Lygus; as a result, scouting becomes more convenient and tractor mounted vacuuming becomes more efficient and targeted. Furthermore, alfalfa trap crops also aid in increasing the beneficial community which further aids in controlling Lygus populations.

Although some organic growers have had great success with using trap crops to aid in controlling Lygus populations, conventional growers have not been as successful. According to Mark Bolda, UC Cooperative Extension Advisor, "The whole trap crop idea is a problem. There are two basic problems with this approach. First, it is difficult to actually keep the lygus in the alfalfa. One UC entomology advisor found lygus above treatment thresholds even 30 beds away; thus, the alfalfa "trap crop" is actually acting as a reserve for infesting other neighboring fields with lygus. The other problem is strawberry growers would have to forsake somewhere between 3 to 5% of their strawberry growing surface to nonproductive alfalfa cropping. It's used by very few people." Furthermore, organic growers also suffer serious yield losses due to lygus and the use of trap crops have not been shown to be an effective management tool in conventional strawberry production systems (Jean-Mari Peltier).

Biological Control:

The repeated use of broad spectrum insecticides (organophosphates, pyrethroids, and neonicotinoids) has affected the IPM system through the reduction of natural enemies including bigeyed bugs, minute pirate bugs, parasitic wasps, and other general predators. Conservation of natural enemies is the basis for biological control in strawberry. When multiple broad spectrum insecticides are required to manage a large influx of Lygus bugs, the inventory of natural enemies, the "biological residue", is removed. As a result, the population of Lygus and other pests (aphid, mites, and whiteflies) continue to grow.

In 2002, a European wasp, *Peristenus relictus,* was introduced near Monterey Bay. The wasp has been slow to establish but now can be found throughout the area. A few growers have been able to achieve economic control of lygus by partly depending on the establishment of the parasitic wasp. Although the wasp has established in certain areas of the state, not all growers are able to benefit from the control measure the parasitic wasp offers to some growers (Jean-Mari Peltier, President, Environmental solutions Group).

Monitoring and Treatment Decisions:

Begin monitoring the strawberry plants in mid-April to detect when adults first appear in the field. Continue monitoring the field regularly after this time to establish whether or not lygus densities are economically important and exceed the treatment threshold.

It is important to note that other factors, such as poor pollination, genetic issues, and environmental impacts, can contribute to deformities in strawberries. When monitoring for lygus, it's important to sample the fields for lygus bugs versus counting the deformed berries. (Dara 2015)

Threshold levels for lygus bugs depend on the monitoring method used. See below for monitoring methods and associated threshold levels:

- When a beat sheet (12-inch embroidery hoop with muslin or other device of similar size) is used, divide the field into blocks and sample four 200-foot lengths of row in each block. Sample one plant in each 20 feet of row by placing the beating tray under the plant and beating it with your hand. Apply insecticides when one lygus nymph is found in 20 plants sampled.

- The Allen-Vac (a modified leaf blower that sucks lygus from the plant into a screen or net placed within the device) is a more efficient sampling device; the threshold to be used when sampling with it is one lygus per 10 plants. Continue weekly monitoring as long as fruit are being harvested for fresh market or freezer pack.

EFFICACY OF USE PROPOSED UNDER SECTION 18

Sulfoxaflor is a part of the sulfoximines class of chemicals and is highly specific for sap-feeding insect pests. Sulfoxaflor is registered federally on several crops including canola (rapeseed) (subgroup 20A), root and tuber vegetables (crop groups 1A and 1B), potatoes (crop groups 1C and 1D), succulent, triticale, and wheat. Sulfoxaflor has been proven to be efficacious on Lygus bugs. DPR entomologists support the use of Sulfoxaflor on Strawberry based on data previously evaluated from use of the product on strawberry and other similar crops.

DPR's review of this efficacy data is submitted in **Attachment D**.

Environmental Solutions Group also submitted data supporting the efficacy of sulfoxaflor on lygus. Please see **Attachments E and F**.

COORDINATION WITH OTHER AFFECTED FEDERAL, STATE, and LOCAL AGENCIES

The appropriate state agencies are also being notified of this specific exemption request through routine weekly notices which the Department of Pesticide Regulation distributes. Comments received after the submission of this request will be forwarded to U.S. EPA.

NOTIFICATION OF REGISTRANT

The registrant of Sequoia Insecticide, Dow AgroSciences, has provided a letter of support for the proposed emergency use (**Attachment G**).

REPEAT USES
(Interim Use Report)

Not applicable. This is a first time new use in California.

PROGRESS TOWARDS REGISTRATION

(Information from registrant concerning the current status)
(Not required for request of a Quarantine Exemption)
(Check All That Apply)

[X] NO APPLICATION FOR REGISTRATION OF THE USE IS UNDER REVIEW BY USEPA.

[ ] USEPA IS REVIEWING AN APPLICATION FOR REGISTRATION OF THIS USE (TYPE OF REGISTRATION ___).

[ ] AN IR-4 PETITION FOR TOLERANCE IS BEING DEVELOPED: PETITION

[ ] A PETITION FOR TOLERANCE HAS BEEN SUBMITTED TO USEPA BY THE MANUFACTURER. PETITION # _____.

[ ] A PETITION FOR TOLERANCE OR AN APPLICATION FOR REGISTRATION HAS BEEN DENIED (INDICATE THE CIRCUMSTANCES _____).

IF THIS USE PATTERN WILL BE NEEDED FOR MORE THAN ONE SEASON, A PERMANENT TOLERANCE SHOULD BE PURSUED IMMEDIATELY. CONTACT THE MANUFACTURER OR IR-4 TO INITIATE THE ESTABLISHMENT OF A PERMANENT TOLERANCE

NAME OF PEST

Scientific Name: *Lygus spp.*
Common Name: Western Tarnished Plant Bug (Lygus Bug)


Figure 1 Adult Lygus bug


Figure 2 Different stages of nymphs

Adult Lygus bugs are sap sucking insects that are about 0.25 inches long and vary in color, from pale green to yellowish brown. Lygus adults are winged and very mobile, making them highly capable of flying from host to host.

Lygus prefer plant parts rich in proteins and lipids, and developing berries and achenes offer a good source of nutrients. When a lygus bug inserts its mouthparts into the developing berry and suck the plant juices, the tissue at the site of feeding does not develop adequately. As a result, fruit deformity occurs as the berry matures. The deformity caused by lygus feeding is commonly known has "catfacing". (Dara 2015)

Three seasonal populations of nymphs occur in California's strawberry fields. The first seasonal population occurs as follows:

- Watsonville/Salinas region as lygus migrate from nearby fields or vegetative strips beginning in March. However, during unusual weather patterns overwintering populations of Lygus can be found as early as January or February.
- In the Santa Maria region, adult lygus are often found in November, as they come from neighboring strawberry fields that have been recently taken out of production.
- In the Orange and San Diego County, lygus can be seen migrating into strawberry fields from other crops or riparian areas as early as March.

The second seasonal population occurs as follows:

- Overwintering populations from the Santa Maria region build up and impact the summer plantings during the months of May or June.
-

The third seasonal population occurs as follows:

- As the temperatures increase across California, a third wave of lygus moves into the strawberry fields late July into August.

Currently, unusual weather conditions have caused the lygus populations to increase to significant populations as early as February, due to the mild winter temperatures. In all cases, the adults from the third generation overwinter and will lay eggs in the spring contributing to next season's population.

Lygus bugs are the single largest cause of crop damage due to insects. They are the major cause of irregularly shaped, catfaced strawberries, which results in unmarketable fruit, causing more than $100 million in, crop losses annually (Jean-Mari Peltier, President, Environmental Solutions Group).

DISCUSSION OF EVENTS OR CIRCUMSTANCES WHICH BROUGHT ABOUT THE EMERGENCY CONDITION

Description of the Crop:
California grows about 88 percent of the nation's strawberries on approximately 33,000 acres along the California coast, with smaller plots scattered throughout the San Joaquin and Sacramento Valleys. Statewide fresh strawberry production averages approximately 50,000 pounds per acre each season. Reported California strawberry acreage for 2018 continues the trend of increasing fruit production on decreasing planted acreage. Over the past three years, planted acreage has declined by 13% while total volume has increased by 6% resulting in two consecutive years of record fruit production. The shift to higher yielding varieties obscures the high levels of loss growers sustain due to lygus. In 2018, reported acreage continues the shift to the highest yielding varieties, particularly the Monterey variety. This trend is more fully documented in the "Significant Economic Loss" section of this request. Total California strawberry acreage reported for 2018 is 33,791, with organic acreage maintaining a proportional share at 11.8 percent.

Strawberries are grown within five distinct areas of California: Watsonville/Salinas, Santa Maria, Oxnard, Orange County/San Diego, and the Central Valley. The Watsonville and Salinas areas account for almost 50% of the state's harvested strawberry value, while Santa Maria comprises about one-third, with Oxnard making up the remainder.

Orange County/San Diego: This district has slipped to just one percent of the acreage in California. Harvest runs from January to May. The first counts of lygus will begin in early March, when the pests migrate from other crops and riparian areas. The post-season application, if made, would be made in June/July. The fields are disced sometime in June or early July, and then replanting would begin again in July or August.

Oxnard: In the Oxnard growing district, fields are planted in the fall for summer harvest and in the summer for winter harvest. Harvest for the summer planting runs from late September to January and

then for the fall planting from January to July. The first lygus would be found on summer plantings by July or August. The field would be disked in December or January, and then replanting would begin again in February or March.

Santa Maria: There are two cropping patterns in Santa Maria with summer and fall plantings. The fall planting can have lygus infestations that start soon after planting in November. The Lygus migrate from strawberry fields from the previous year and severe infestations can develop as early as February or March depending on the winter weather. The summer planting can develop lygus infestations in May or June. There are two harvest periods in this growing district. Harvest occurs February to December from the fall plantings and then continues into March all the way through October. The peak production volume occurs during the second phase of harvesting.

Watsonville/Salinas: In the Watsonville/Salinas region, the growers harvest from March through November. The first lygus are typically found in March; although overwintering populations may be found as early as January or February. The fields are disked during October or November, and then replanting would begin again in February/March with a different crop.

Central Valley: There is virtually no large-scale commercial production in the Central Valley, but small plantings dot rural and suburban landscapes in several central valley counties. Production is generally sold directly by growers in roadside stands and farmer's markets.

California strawberry plants are first grown in a nursery, and then transplanted annually into grower's fields in raised beds. The beds are covered with plastic mulch to keep the berries away from the soil and help conserve water. Drip irrigation reduces disease problems by keeping moisture away from the fruit while using water more efficiently. All California strawberry cultivars are self-fertile; the flowers are hermaphroditic which means they possess both male (stamens) and female (pistils) parts. The time from flower development to fruiting takes 25 to 42 days depending on cultivar and weather.

Honeybees are not essential for strawberry pollination (Darrow, 1966; UC Statewide IPM program, 2008). In addition, it has been observed that bees do not prefer to forage on strawberries and evidence suggests that pollinators would prefer to forage on wild plants rather than on strawberries (Eilidh and Goulson, 2014).

California strawberries are available year round. In winter, strawberry production occurs in Southern California and then production moves north as the temperatures increase across the state. Strawberry production peaks in April through June as production in all districts overlaps, and an average of six to seven million trays a week are harvested across the state. After June 1, about 50% of the statewide strawberry crop is harvested.

The plants will continually produce new fruit throughout their three to seven month harvest season. During peak season plants are harvested every three days. The grower decides to disk the field when berry production and blooming begin to wane. After the final strawberry harvest, growers remove plastic and drip tape, then disk the field in preparation for the next crop.

Description of the emergency:

Lygus bugs are the largest cause of crop damage in California strawberry production. Lygus are the major cause of irregularly shaped, catfaced strawberries, resulting in unmarketable fruit. According to Jean-Mari Peltier, Environmental Solutions Group, lygus cause more than $100 million in crop losses annually. In addition, the pest is highly mobile, abundant, and has many hosts. As pointed out in DPR's 2015 Summary of Pesticide Use Report Data, even in growing districts in the south coast which didn't previously consider lygus a major problem, growers now struggle to control lygus populations (**Attachment H**).

There is no single cause of the explosion of lygus populations in California strawberry fields. The following all have contributed to the increased populations of lygus (Jean-Mari Peltier, Environmental Solutions Group):

- Resistance development to older chemistries
- Unusual weather patterns, California has experienced warmer than normal weather
- Changing cropping patterns and overwintering

Resistance Development:

Growers, pest control advisors, and UC Cooperative Extensions have reported high rates of resistance development to older lygus materials, resulting in significantly lower efficacy. The history of the pest management regime for lygus has been the gradual replacement of organophosphate pesticides by pyrethroid chemistries, a combination of pyrethroids and neonicotinoids, and two newly registered products. Both organophosphates, malathion, and naled have become ineffective due to resistance development. Today, the pyrethroids that replaced the organophosphates are also exhibiting significant reduction in efficacy due to resistance development.

Lygus sprays must be timed to target the first and second nymphal instars since these stages are the most susceptible. Additionally, most of the registered materials are generally not very effective on adults. It is also important to limit the number of treatments for lygus to avoid further resistance development. Because the pyrethroid insecticides bifenthrin and fenpropathrin had been the most effective pesticides for control of lygus bugs, they were used extensively, resulting in widespread resistance. Today, pyrethroids tend to be more effective when used in combination with the neonicotinoid insecticides thiamethoxam or acetamiprid. Of course, total reliance on these combinations will only hasten the development of resistance. In addition, the use of these pyrethroids can interfere with biological control practices such as the use of predatory mites to manage two-spotted spider mites.

More recently, an insect growth regulator, Rimon® (novaluron), has been registered and provides moderate control of lygus by filling the niche that occurs early in the season for managing the nymphs of the first lygus bug hatch. Rimon® is only effective against the first two instars and has no effect on adult lygus bugs. The number of applications is limited to three applications per year, and this limitation is insufficient to provide control of later-season lygus hatches.

Beleaf™ (flonicamid), an insecticide that affects the ability of lygus to feed. Beleaf™ is used following the initial Rimon® application, to target all feeding stages. Beleaf™ is limited to three applications per year. This restriction allows growers to only have effective control measures 9 weeks out of the 24 week long season (Mark Bolda 2018).

Unusual Weather Patterns:
Lygus bug populations overwinter as pre-sexual adults. They emerge in winter, find suitable hosts, mature, and reproduce. In certain years, weather patterns provide ideal conditions for a large spring buildup. These conditions include early, frequent, and extended rainfall patterns and temperatures warm enough to allow for development (50◦ F or greater). These are the conditions that have allowed a large Lygus bug population to develop in weedy and abandoned fields (untended due to prolonged drought) and weedy right of ways. These wild hosts dry down in late May and early June, releasing the population into neighboring fields.

The California strawberry industry is experiencing an unprecedented infestation of Lygus bugs. The emergency exists because natural conditions created overwhelming Lygus infestations, requiring repeated applications of broad spectrum insecticides. The strawberry industry is experiencing continued, intense pressure from Lygus bugs due to the recent wet, extended winter. Due to heavy winter rains and the extended period of rainfall, the weed population in areas surrounding strawberry fields (right of ways, highways, and natural areas) was able to thrive. Consequently, the weed population remained a viable host for Lygus for a prolonged period during March to May.

Changing Cropping Patterns & Overwintering:
On the Central Coast, lygus overwinter in weeds and other host crops and move into developing strawberry fields in the late spring. In the Oxnard area 3,000 to 4,000 acres of summer-planted berries provide lygus with a continuous host at a time when lygus thrive in the warm weather. (Jean-Mari Peltier, Environmental Solutions Group)

The California Strawberry Commission's Efforts to Address the Lygus Emergency:
To address the lygus emergency, the California Strawberry Commission (CSC) has conducted extensive grower outreach to provide instruction to growers and their employees on how to use beat boxes and hoops. The CSC has also provided outreach to help growers distinguish lygus from other pests. Importantly, CSC conducted trials on using and improving the effectiveness of bug vacuums. Over the past few years, use of the vacuums (which cost $50,000 apiece) has been far more common across all strawberry districts. One of the findings from intensive evaluation of lygus populations is that strawberry fields planted next to second year plantings of strawberries had significantly higher population levels. As a result, growers have almost entirely eliminated the practice of second year berries.

Importantly, it should be noted that IPM is predicated on there being a pest threshold, below which growers can still produce profitably. Ultimately and unfortunately, what the Commission has learned through its research is that there is currently no IPM approach that will result in effective control of lygus. No matter what a grower does to deploy his lygus management tools (i.e. insecticides, cultivars, vacuums), if they are in an area with lygus, the population will ultimately reach threshold and exceed it.

The current threshold levels do not provide economic protection. At the reported economic threshold of 1 lygus per 20 plants, the Commission found there would be 10 to 20% fruit damage. According to Dr. Hillary Thomas, one lygus per twenty plants translates to more than $5,000/acre losses in marketable crop. In discussions with Dr. Frank Zalom, UC IPM Extension Specialist, he acknowledged the threshold number was set at one per twenty plants so scouts would actually notice them. A more realistic threshold would be closer to one in one hundred plants, but that wouldn't be a practical scouting tool in the field. The Commission has rarely seen a field that exceeded the reported threshold of one per twenty be brought back under the threshold using currently available control methods. (Jean-Mari Peltier, Environmental Solutions Group)

It has been observed that lygus numbers have reached critical levels and with the growers exhausting applications of all other available pesticides, there is a real need to add an additional effective pesticide. Growers are implementing both chemical and non-chemical controls. However, current materials are not sufficient to manage this pest and additional measures, such as the proposed use of Sulfoxaflor, are needed to strengthen IPM, facilitate resistance management planning, and preserve the longevity of existing registered pesticides.

Benefits of Sulfoxaflor:
Sulfoxaflor (Sequoia™ product) is an active ingredient with a unique mode of action which works on insects that are resistant to other products. Sulfoxflor provides control for both nymphs and adults and would be an important rotation partner for other chemistries. Used as requested in this application, the product Sequoia™ will offer growers better control of lygus bugs throughout the growing season.

The addition of sulfoxaflor would aid in the following:

- Strengthen IPM implementation during early and mid-strawberry season to prevent increased losses later in the season.

- Facilitate resistance management planning to preserve the longevity of newly registered pesticides such as Beleaf™ & Rimon®. Both are newer chemistries and are selective materials that aid in decreasing the impact to beneficial insects than older pesticide standards (Danitol, Dibrom, malathion).

- Reduce the need for neonicotinoid chemistries that are typically mixed with organophosphate and pyrethroid chemistries to enhance efficacy.

- Allow for the reduced use of broad spectrum organophosphate and pyrethroid materials.

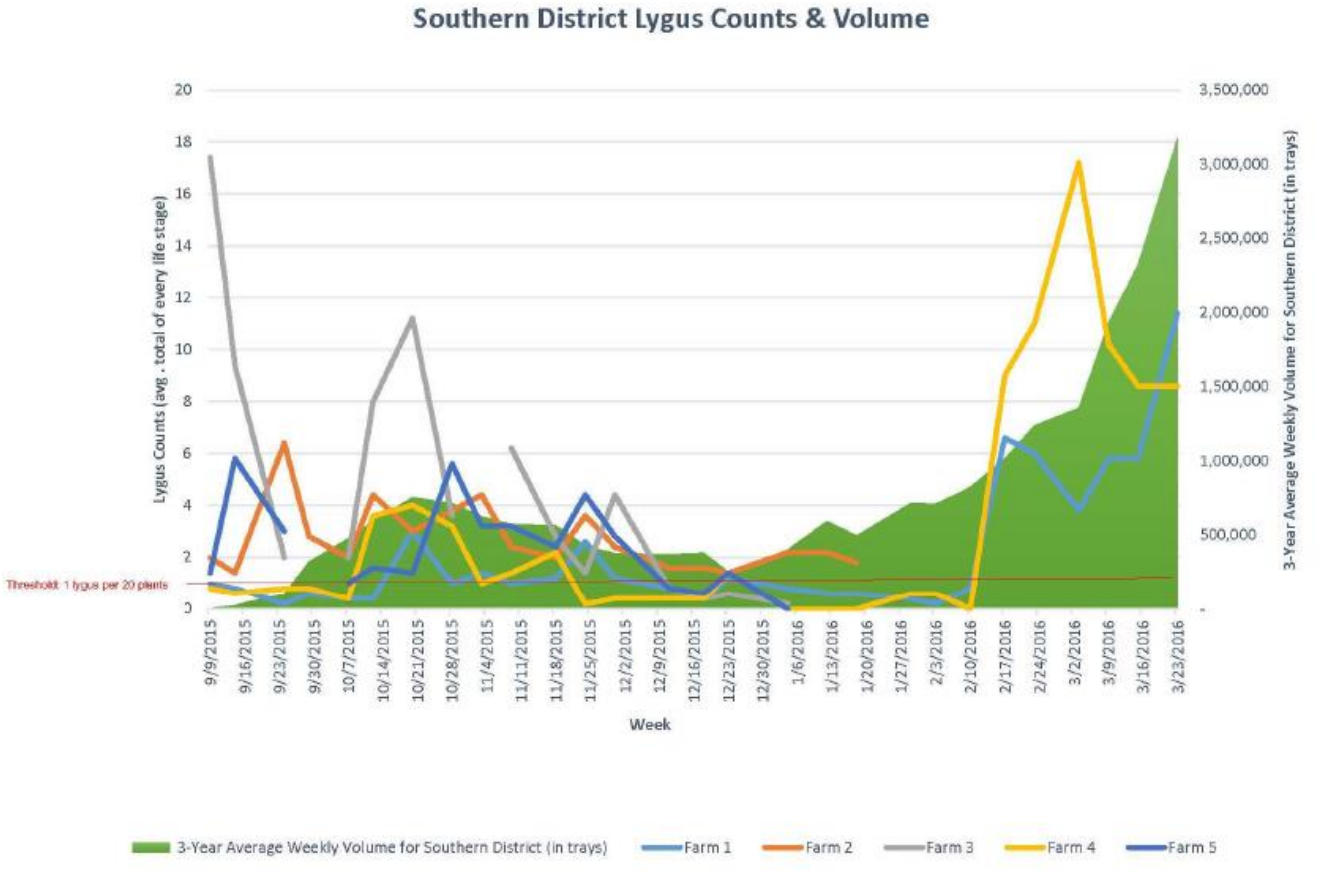
- Delay use of broad spectrum materials during the course of the season and replace less effective chemistries to help reduce the total number of sprays used by strawberry growers during the course of the season.

- Reduce economic losses by reducing lygus and percent fruit cull due to lygus feeding.

Population Density Data:
Between 2013 and 2016, CSC conducted lygus counts on multiple farms located throughout all three growing districts. The counts were taken using beat boxes at nearly two dozen farms. The raw data from these scouting trials has been shared with the Strawberry Center located at Cal Poly State University, San Luis Obispo, California.

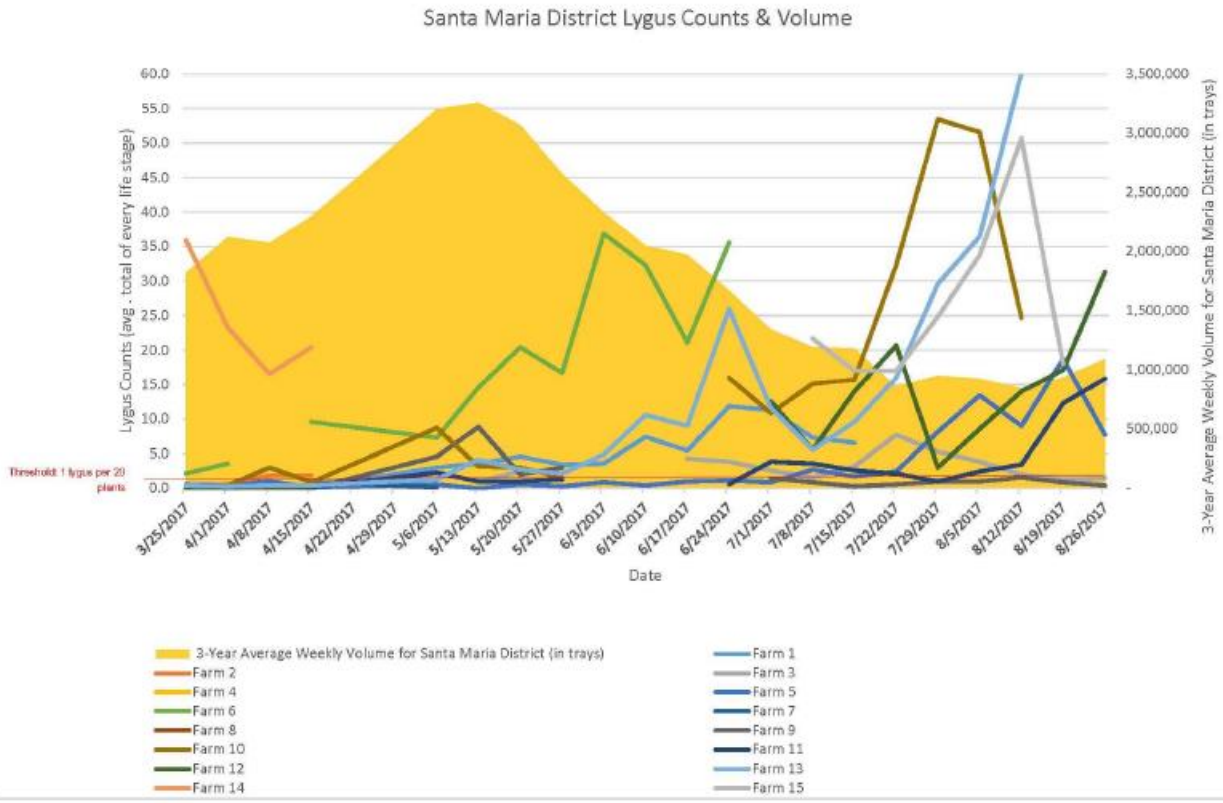
To support this Section 18 request, Environmental Solutions Group is sharing preliminary data from these trials with DPR and the U.S. EPA. Devastating infestations were documented and, in some instances, exceeded 100 lygus per 20 plants. The following charts document lygus counts taken at various farms and for three major growing districts: Watsonville/Salinas, Santa Maria and Oxnard. Data has been grouped by year and growing district. In addition, a secondary axis has been included to show a three-year average of volume (in trays) for that time-period to give a clearer picture of when the pest is hitting during the production season.

As the charts below demonstrate lygus pressure intensifies as production hits its peak, and in most fields lygus counts are at or above threshold for most of the season. The tables below document that nearly every farm monitored exceeded the threshold of one lygus per 20 plants during the years of 2016 to 2017. In some cases, the lygus counts exceeded 50 bugs per 20 plants. Environmental Solutions Group included harvest statistics for background information and stated "Lygus populations do not neatly correspond to harvested trays."



Southern District Lygus Counts & Volume						
Week Sampled	Lygus Counts (avg . total of every life stage)					3-Year Average Weekly
	Farm 1	Farm 2	Farm 3	Farm 4	Farm 5	
9/9/2015	1	2	17.4	0.8	1.4	4,307
9/14/2015	0.8	1.4	9.4	0.6	5.8	25,747
9/24/2015	0.2	6.4	2	0.8	3	104,312
9/29/2015	0.6	2.8		0.8		321,267
10/7/2015	0.4	2	2	0.4	1	478,622
10/12/2015	0.4	4.4	8	3.6	1.6	594,956
10/20/2015	3	3	11.2	4	1.4	755,003
10/28/2015	1	3.8	3.6	3.2	5.6	715,157
11/3/2015	1.4	4.4		1	3.2	625,522
11/9/2015	1	2.4	6.2	1.4	3.2	574,353
11/18/2015	1.2	2	2.8	2.2	2.4	564,417
11/24/2015	2.6	3.6	1.4	0.2	4.4	431,541
11/30/2015	1.2	2.4	4.4	0.4	2.8	378,047
12/11/2015	0.8	1.6	0.8	0.4	0.8	371,650
12/18/2015	0.4	1.6	0.4	0.4	0.6	381,106
12/23/2015	1.2	1.4	0.6	1.4	1.4	254,783
1/4/2016	0.8	2.2	0.2	0	0	403,001
1/12/2016	0.6	2.2		0		593,334
1/18/2016	0.6	1.8		0		496,231
1/29/2016	0.4			0.6		716,560
2/3/2016	0.2			0.6		708,370
2/10/2016	0.8			0		823,872
2/17/2016	6.6			9		1,016,304
2/23/2016	6			11		1,239,596
3/3/2016	3.8			17.2		1,358,924
3/9/2016	5.8			10.2		1,931,788
3/15/2016	5.8			8.6		2,328,545
3/23/2016	11.4			8.6		3,179,522

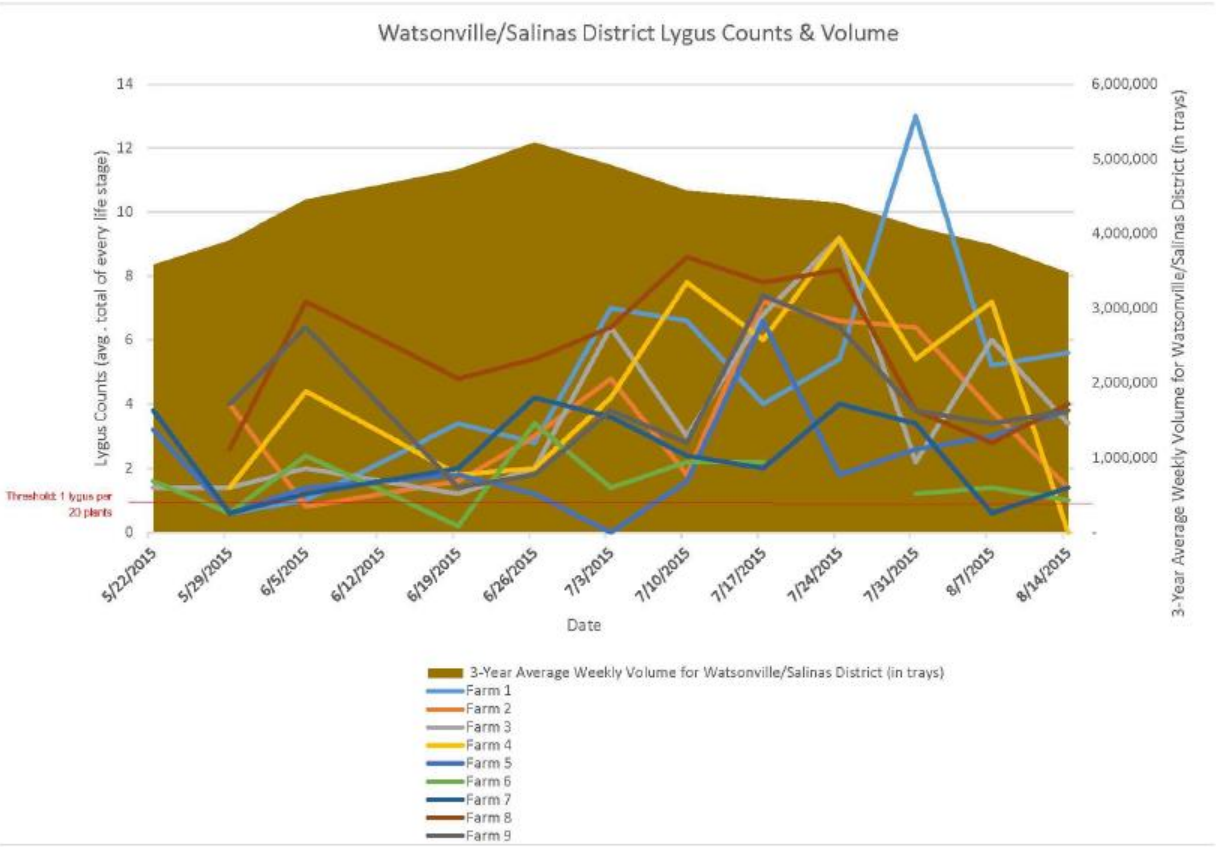
Red text represents lygus counts above the threshold of 1 per 20 plants



Santa Maria District Lygus Counts & Volume

Week Sampled	Lygus Counts (avg . total of every life stage)															3-Year Average Weekly
	Farm 1	Farm 2	Farm 3	Farm 4	Farm 5	Farm 6	Farm 7	Farm 8	Farm 9	Farm 10	Farm 11	Farm 12	Farm 13	Farm 14	Farm 15	
2/11/2017	0.43	0.00	0.00	0.43	1.00	0.00	0.14	0.00	0.00	0.00	0.00	0.14				84,238
2/18/2017	0.57	0.00	0.00	0.57	1.14	2.57	0.14	0.14	0.00	0.00	0.14	0.00				189,506
2/25/2017	1.00	0.14	0.00	0.29	0.71	2.71	0.00	0.00	0.00	0.00	0.00	0.00				336,348
3/4/2017	0.43	0.71	0.00	0.14	1.00	2.29	0.00	0.14	0.00	0.14	0.00	0.00	0.43			529,786
3/11/2017	0.71	0.14	0.00	0.29	0.29	1.86	0.29	0.43	0.00	0.00	0.43	0.00	0.14			629,432
3/18/2017	0.57	0.29	0.00	0.00	0.43	2.14	0.14	0.14	0.00	0.43	0.14	0.00	1.29			1,145,164
3/25/2017	0.43	0.43	0.00	0.00	0.57	2.14	0.14	0.00	0.14	0.14	0.00	0.00	0.43	35.86		1,820,308
4/1/2017	0.43	0.57	0.00		0.43	3.57	0.14	0.00	0.00	0.43	0.00	0.14	0.29	23.29		2,119,314
4/8/2017	0.29	1.86	0.00	0.86	1.00			0.14	0.00	3.00	0.43	0.14	0.43	16.57		2,073,380
4/15/2017	0.14	1.86	0.14	0.29	0.14	9.57	0.86	0.00	0.00	0.86	0.14	0.29	0.43	20.43		2,296,614
4/22/2017																2,483,619
4/29/2017																2,935,034
5/6/2017	3.00		2.14		0.57	7.29	0.14		4.57	8.71	2.29		1.29			3,199,818
5/13/2017	3.57		1.00		0.00	14.57			8.86	3.14	1.00		4.14			3,257,149
5/20/2017	4.57		2.43		0.57	20.43			2.00	3.00	1.00		2.71			3,067,690
5/27/2017	3.43				0.29	16.71			3.00	1.57	1.29		2.14			2,657,330
6/3/2017	3.57				0.86	36.86							4.86			2,330,409
6/10/2017	7.43				0.43	32.29				4.00			10.57			2,048,053
6/17/2017	5.43		4.29		1.00	21.14							9.00			1,971,598
6/24/2017	11.86		3.86		1.14	35.57				16.00	0.57		26.00			1,669,585
7/1/2017	11.29		2.57		0.86				1.43	10.86	3.86	12.57	11.57			1,340,502
7/8/2017	7.29		1.57		2.71				0.86	15.14	3.57	5.57	5.57		21.71	1,194,730
7/15/2017	6.57		3.14		1.71				0.29	15.71	2.57	14.00	9.57		17.00	1,179,440
7/22/2017			7.71		2.43				0.57	32.29	2.14	20.71	16.00		17.00	859,107
7/29/2017			5.29		8.14				1.00	53.43	1.00	3.00	29.57		24.86	949,565
8/5/2017			3.86		13.43				1.00	51.57	2.43	8.57	36.43		33.71	925,394
8/12/2017			2.00		9.00				1.57	24.71	3.43	14.00	60.14		50.71	843,518
8/19/2017			1.29		18.71				0.86		12.29	17.14	79.71		18.00	987,042
8/26/2017			1.43		7.71				0.43		15.86	31.29	109.29			1,090,395

Red text represents lygus counts above the threshold of 1 per 20 plants



Watsonville/Salinas District Lygus Counts & Volume

Week Sampled	Lygus Counts (avg . total of every life stage)									3-Year Average Weekly Volume for
	Farm 1	Farm 2	Farm 3	Farm 4	Farm 5	Farm 6	Farm 7	Farm 8	Farm 9	
5/15/2015	4.6	5		10.6						2,988,042
5/22/2015			1.4		3.2	1.6	3.8			3,579,745
5/29/2015	0.6	4	1.4	1.4	0.6	0.6	0.6	2.6	4	3,906,147
6/5/2015	1	0.8	2	4.4	1.4	2.4	1.2	7.2	6.4	4,451,083
6/12/2015										4,817,818
6/19/2015	3.4	1.6	1.2	1.8	1.8	0.2	2	4.8	1.4	4,855,824
6/26/2015	2.8	3	2	2	1.2	3.4	4.2	5.4	1.8	5,215,998
7/3/2015	7	4.8	6.4	4.2	0	1.4	3.6	6.4	3.8	4,915,813
7/10/2015	6.6	1.8	3	7.8	1.6	2.2	2.4	8.6	2.8	4,571,172
7/17/2015	4	7.2	6.8	6	6.6	2.2	2	7.8	7.4	4,485,096
7/24/2015	5.4	6.6	9.2	9.2	1.8		4	8.2	6.4	4,404,403
7/31/2015	13	6.4	2.2	5.4	2.6	1.2	3.4	3.8	3.8	4,087,482
8/7/2015	5.2	3.8	6	7.2	3	1.4	0.6	2.8	3.4	3,847,740
8/14/2015	5.6	1.4	3.4	0	3.8	1	1.4	4	3.8	3,471,759

Red text represents lygus counts above the threshold of 1 per 20 plants

As these charts demonstrate, virtually every farm scouted had infestations above the treatment threshold of 1 lygus per 20 plants. Clearly, the California strawberry industry is facing extreme economic pressure from its inability to control this pest.

SIGNIFICANT ECONOMIC LOSS (SEL)
(Criteria for determining SEL)

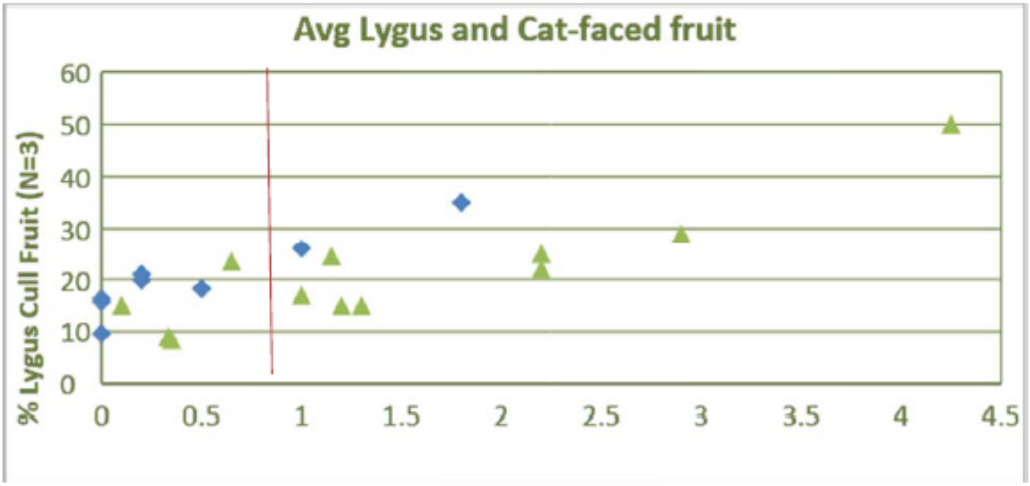
Commercial strawberry production relies on multiple inputs costing producers over $60,000 per acre, which equates to nearly 90% of the value of the crop. Strawberry growers work with a small margin of error and loss; therefore, growers depend on predictable yields to cover production costs. This only underscores the importance of farmer access to reliable materials for pest control, particularly when it comes to a pest that has such great potential to affect yield. In reality, growers cannot measure lygus populations at levels low enough to meet a meaningful economic threshold (Jean-Mari Peltier, Environmental Solutions Group).

Mark Bolda, UC Cooperative Extension Scientist, explained that the current levels of lygus found in strawberry, especially toward the latter part of the season, are serious and causing tremendous amounts of damage. Under normal conditions, the strawberry industry will see a 20% loss in fruit from lygus damage per year. With the levels of Lygus the growers are currently experiencing, Mark has witnessed some growers losing their entire late summer crop of strawberries, especially in the warmer areas of the Central Coast like Castroville, Salinas, and Santa Maria.

Additionally, the inability to control lygus populations has forced some growers to change their harvest practices. In an effort to mitigate lygus infestations, towards the end of production, instead of switching from harvesting for fresh fruit to harvesting for processing, as is customary, some growers are destroying their crop. As a result, the growers lose additional profitability in an effort to control Lygus populations.

Evaluation of Unmarketable Strawberry Fruit Due to Lygus Damage

Below is a chart illustrating the population pressure and associated fruit damage seen in California strawberry production with intensive evaluation of several fields in 2013. The chart illustrates that the growers can experience as much as 25% catfaced fruit at the current threshold of 1 lygus per 20 plants. In some cases, the growers even saw as much as 20% loss with monitoring 1 lygus per 40 plants.



As a part of its on-going work on lygus in strawberries, CSC validated the above trial in July 2015. The CSC conducted an intensive evaluation of unmarketable strawberry fruit due to lygus damage. The evaluation occurred on three farms in the Oxnard growing district. At each farm, lygus counts were taken weekly over the period of June 15 through July 6, 2015. The beat box method was used to take five samples on each sampling date. The growers followed the threshold of one lygus per twenty plants.

Three weeks after the first sample was taken, on July 7, 2015, the fruit was evaluated for loss due to lygus. For the fruit evaluation, four samples of approximately 50 fruits were taken from the sample area. The sampling accounted for marketable fruit, culls due to lygus and culls due to other causes. Through the sampling process, CSC documented the following:

- Fruit loss when over the threshold of one lygus per twenty plants

- Devastating levels of loss due to lygus.

The data shows that Farm #1 experienced losses of 72 percent due to lygus damage. The evaluation found that on average, 40 percent of fruit is culled due to lygus damage. A summary of the results are below. DPR asked for further background information about the fields, and the applicant was not able to provide this information. (The three farms involved in the study were managed by the same grower.)

Farm #1

Average lygus counts from multiple samples taken on each date:

Farm 1	Adults	Lg Nymphs	Sm Nymphs
6/15/2015	1.4	1.2	4.8
6/23/2015	5.8	5.2	17.2
7/1/2015	6.2	7.6	22
7/6/2015	5.6	7.4	12

Marketable and Unmarketable Fruit:

Sample	1	2	3	4	AVG	Percent
Marketable	12	16	12	23	15.75	26.03
Lygus Culls	45	42	41	46	43.50	71.90
Other Culls	1	2	2	0	1.25	2.07
Total	58	60	55	69	60.5	100

Farm #2

Average lygus counts from multiple samples taken on each date:

Farm 2	Adults	Lg Nymphs	Sm Nymphs
6/15/2015	3.8	0.8	6
6/23/2015	4.4	2.2	6.6
7/1/2015	5	1.2	5.4
7/6/2015	2.6	1	7.4

Marketable & Unmarketable Fruit:

Sample	1	2	3	4	AVG	Percent
Marketable	39	33	27	29	32.00	58.18
Lygus Culls	12	12	19	26	17.25	31.36
Other Culls	8	9	4	2	5.75	10.45
Total	59	54	50	57	55	100.00

Farm #3

Average lygus counts from multiple samples taken on each date:

Farm 3	Adults	Lg Nymphs	Sm Nymphs
6/15/2015	1.4	1.4	5.4
6/23/2015	1.8	1	7.2
7/1/2015	2.8	1.2	6.2
7/6/2015	3.8	1.4	10.2

Marketable & Unmarketable Fruit:

Sample	1	2	3	4	AVG	Percent
Marketable	39	47	47	41	43.50	76.32
Lygus Culls	14	9	8	8	9.75	17.11
Other Culls	3	4	2	6	3.75	6.58
Total	56	60	57	55	57.00	100.00

Actual Production of University of California Fall & Summer-planted Strawberries Compared to Potential Cultivar Yield (productive capacity)

As explained earlier in this application, the switch to higher yielding varieties has masked the losses experienced by the California strawberry industry due to lygus. To further document the economic losses growers are experiencing, Environmental Solutions Group calculated the total potential yield and compared it to actual production figures for 2014 through 2017 (and 2018 projected.)

The California Strawberry Commission annually collects data about plantings by variety and season planted in their annual acreage surveys. In addition, the University of California, Davis publishes a report on the UC-patented varieties. This publication reports the "performance" (also called "yield" or "productive capacity") of all UC varieties at the Watsonville Research Facility. Environmental Solutions Group evaluated each variety based on its potential yield in terms of trays per acre, as reported by the university. (Note: Data for the productive capacity per acre on the portion of land planted with proprietary varieties is not available. As a result, Environmental Solutions Group's analysis focused on non-proprietary varieties.)

Environmental Solutions Group multiplied acres planted, by variety - times its productive capacity, for each of the years 2014 through 2018 to get a total "productive capacity" statewide. This figure was divided by acres planted each year (2014 to 2018) of all of the nonproprietary varieties. A figure equal to 20% of overall production was excluded from the tabulation to account for processing tonnage (based on figures from the CA Processing Strawberry Association) in order to calculate total fresh market potential productivity in trays.

The following table documents the difference between productive capacity of fall-planted nonproprietary acreage and actual average production for each of the years 2014 through 2018. Environmental Solutions Group assumed that in addition to fresh trays, an additional volume of fruit would be sent to processing, using the typical processing volume of 20% of the crop.

FALL PLANTINGS NON-PROPRIETARY VARIETIES: *(Productivity Capacity, Actual Production, Loss Estimate, and Value)*

	2014	2015	2016	2017	2018
State acreage non-proprietary varieties[4]	19,158	16,945	15,815	17,483	16,399
Productive capacity of state[5]	183,141,735	167,773,468	160,513,196	178,224,220	168,888,605
Total productive capacity (trays/acre) statewide for non-proprietary varieties[6]	9,560	9,901	10,149	10,194	10,299
Productive capacity for the fresh market (trays/acre)[7]	7,648	7,921	8,120	8,155	8,239
Actual fresh market trays/acre statewide[8]	4,941	4,991	5,462	5,662	unknown
Variation of capacity and actual fresh market (trays/ acre)	**(2,707)**	**(2,930)**	**(2,658)**	**(2,493)**	unknown
Lost trays/acre at 10% 1oss[9]	765	792	812	816	unknown
Lost trays/acre at 20% loss[10]	1,530	1,584	1,624	1,631	unknown
Average price/tray[11]	$10.78	$10.53	$10.23	$9.56	unknown
Value lost/acre at 10% loss[12]	$8,244	$8,341	$8,306	$7,796	unknown
Value lost/acre at 20% loss[13]	$16,488	$16,681	$16,613	$15,593	unknown

[4]CSC Acreage Survey, http://www.calstrawberry.com/Portals/2/Reports/Industry%20Reports/Acreage%20Survey/2018%20Acreage%20Survey.pdf? ver=2018-01-12-075429-077

[5]Acres planted times productive capacity of UC Varieties, The UC Patented Strawberry Cultivars, http://research.ucdavis.edu/industry/ia/industry/strawberry/cultivars/

[6]Reflects total productive capacity divided by total acres planted

[7]To Determine the Productive Capacity for the Fresh Market, we took the Total Productive Capacity less 20% processing; Note: Processing Strawberry Advisory Board data was analyzed to determine that on average 20% of total production goes to processing.

[8]Both proprietary and non-proprietary, CSC District Report, http://www.calstrawberry.com/en-us/market-data/district-report

[9]Total fresh market capacity (in trays) times 10%

[10]Total fresh market capacity (in trays) times 20%

[11]CSC District Report: http://www.calstrawberry.com/en-us/market-data/district-report

[12]Lost trays multiplied by average price per tray

[13]Lost trays multiplied by average price per tray

As the above table demonstrates, statewide production has fallen short of productive capacity by between 2,493 trays per acre to 2,930 trays each year between 2014 and 2017. Assuming only 10% of total production per acre is attributable to lygus, this equates to 765 to 816 trays lost per acre annually. If you assume 20% of production is lost as a result of lygus that amounts to approximately 1,530 to 1,624 trays lost per acre due to lygus. Revenue losses range from $7,796 per acre at 10% lost to as much as $16, 696 per acre.

The next table shows the same evaluation on summer planted acreage. This table demonstrates similar number of lost trays from summer plantings as calculated for the fall planted varieties. Total variation from productive capacity in trays/acre has been as much as nearly 2,600 per acre. Revenue losses over the period 2014 to 2018 ranged from a low of $7,058 per acre at 10% loss due to lygus, to a high of $16,255 per acre at 20% loss due to lygus.

SUMMER PLANTINGS NON-PROPRIETARY VARIETIES:
(Productivity Capacity, Actual Production, Loss Estimate, and Value)

	2014	2015	2016	2017	2018
State acreage non-proprietary varieties[14]	2,249	2,951	3,919	3,820	3,097
Productive capacity of state[15]	21,194,698	27,514,941	36,209,930	35,252,777	28,432,662
Total productive capacity (trays/acre) statewide[16]	9,424	9,324	9,240	9,228	9,181
Productive capacity for the fresh market (trays/acre)[17]	7,539	7,459	7,392	7,383	7,345
Actual fresh market trays/acre statewide[18]	4,941	4,991	5,462	5,662	unknown
Variation of capacity and actual fresh market (trays/ acre)	(2,598)	(2,468)	(1,930)	(1,721)	unknown
Lost trays/acre at 10% loss[19]	754	746	739	738	unknown
Lost trays/acre at 20% loss[20]	1,508	1,492	1,478	1,477	unknown
Average price/tray[21]	$10.78	$10.53	$10.23	$9.56	unknown
Value lost/acre at 10% loss[22]	$8,127	$7,854	$7,562	$7,058	unknown
Value lost/acre at 20% loss[23]	$16,255	$15,709	$15,123	$14,116	unknown

[14]CSC Acreage Survey, http://www.calstrawberry.com/Portals/2/Reports/Industry%20Reports/Acreage%20Survey/2018%20Acreage%20Survey.pdf?ver=2018-01-12-075429-077
[15]Acres planted times productive capacity of UC Varieties, The UC Patented Strawberry Cultivars, http://research.ucdavis.edu/industry/ia/industry/strawberry/cultivars/
[16]Reflects total productive capacity divided by total acres planted
[17]To Determine the Productive Capacity for the Fresh Market, we took the Total Productive Capacity less 20% processing; Note Processing Strawberry Advisory Board Data was analyzed to determine that on average 20 percent of total production goes to processing.
[18]Both proprietary and non-proprietary, CSC District Report, http://www.calstrawberry.com/en-us/market-data/district-report
[19]Total fresh market capacity (in trays) times 10%
[20]Total fresh market capacity (in trays) times 20%
[21]CSC District Report, http://www.calstrawberry.com/en-us/market-data/district-report
[22]Lost trays multiplied by average price per tray
[23]Lost trays multiplied by average price per tray

Losses from Farm 3 in the Santa Maria District:

DPR asked for economic data for each of the Farms in the Santa Maria Growing Region involved in the 2017 lygus sampling project for Lygus counts (see previous charts on pages 18 to 21). More specifically, DPR asked for data from farms that experienced extreme levels of Lygus, ranging from 1.3 to 109.3 lygus per 20 plants. Despite the California Strawberry Commissions (CSC) best efforts, they could not get data from the farming operations with high populations of lygus infestations. Several of the farms are no longer in business.

However, the CSC was able to secure the production statistics from Farm # 3, and the farm experienced anywhere from 1 to 7.7 lygus per 20 plants during the sampling period. While the level of lygus infestation was significantly lower than that of Farm 13, nevertheless, the grower saw a reduction in yield. Farm # 3 experienced a 15% reduction in revenue compared to the previous year and an 11.9% loss compared to the average of the last two years. One could extrapolate that the figures would be much worse for those with the higher infestations.

Farm #3 Production Data

Year	Actual Yield/Acre	Average Price/Tray	Actual Gross / Acre (Fresh)	Reduction in Gross / Acre from best year	% Reduction
2015	**6,491**	$ 10.82	$ 70,233		
2016	**7,058**	$ 10.23	$ 72,203	$ -	0%
2017	**6,648**	$ 9.43	$ 62,691	$(9,512.70)	-15%

FOOD QUALITY PROTECTION ACT OF1996

(Use separate attachment if necessary)

1. **Environmental Fate:** Sulfoxaflor has a relatively short environmental half-life. Residues are unlikely to be found in soil following application. The rapid soil degradation of sulfoxaflor reduces the likelihood that it will be available for transport to water or sediment via runoff. Soil dissipation/accumulation of sulfoxaflor under North American (United States and Canada) field conditions was conducted in bare plots and cropped plots at 5 sites. No sulfoxaflor soil residues greater than the analytical method LOQ (0.001 ppm) were determined below the top eighteen (18) inches of soil at any time during the study. At the California test site, no residues of sulfoxaflor were determined in any soil-pore water samples collected from all lysimeter depths (3, 6, and 9 ft) during the entire study. Sulfoxaflor residues are unlikely to be found in ground or surface water following application to crops.

2. **Residential Use:** There are currently no residential uses of sulfoxaflor.

3. **Mode of Action:** Sulfoxaflor is the first member of a new class of insecticides, the sulfoximines. Sulfoxaflor consists of two diastereomers in a ratio of approximately 50:50 with each diastereomer consisting of two enantiomers. Sulfoxaflor is systemically distributed in plants when applied. The chemical acts through both contact action and ingestion and provides both rapid knockdown (symptoms are typically observed within 1-2 hours of application) and residual control (generally provides from 7 to 21 days of residual control). The sulfoximines are a novel class of insecticides which act through a unique interaction with the nicotinic acetylcholine receptor in insects. Sulfoxaflor is a highly efficacious agonist of the nicotinic receptor. The structural novelty of sulfoxaflor makes it stable in the presence of monooxygenase enzymes that degrade neonicotinoids and cause virtually all known cases of resistance in the field of that class of insecticides. All of these factors contribute to the broad lack of cross-resistance to existing insecticide chemistries. Sulfoxaflor has its own unique Insect Resistance Action Committee (IRAC) classification (4C).

4. **Harvest Season:**
   Orange County: January – May
   Oxnard: January to July and September to January
   Santa Maria: February – December
   Watsonville/Salinas: March – November

DISCUSSION OF ANTICIPATED RISKS TO ENDANGERED OR THREATENED SPECIES, BENEFICIAL ORGANISMS, OR THE ENVIRONMENT

The toxicity of sulfoxaflor to fish and wildlife has been reviewed by DPR, and the results of this review will be forwarded shortly.

DPR has evaluated pesticide exposure to endangered species habitats in California, classifying risk and developing protection strategies to minimize risk as needed. DPR coordinates endangered species protection strategies with the Department of Fish and Wildlife, the Department of Food and Agriculture, the County Agricultural Commissioners, and U.S. EPA in accordance with a state plan. Mitigation measures have been put in place and can be found at http://www.cdpr.ca.gov/docs/endspec/index.htm.

The Section 18 Use Instructions will contain the following language and recommendations to avoid exposures to any listed species.

"Use of this product may pose a hazard to endangered or threatened species. Before applying this product, applicators must obtain information regarding the proximity of endangered species habitats and follow any applicable use limitations. Contact your County Agricultural Commissioner or refer to the Department of Pesticide Regulation's PRESCRIBE Internet Database: http://www.cdpr.ca.gov/docs/endspec/prescint.htm for details."

In addition, the Sequoia product label bears language to mitigate environmental hazards and outlines the precautions to follow when it is used near an aquatic environment.

ATTACHMENTS

A. Proposed DRAFT Section 18 Use Instructions.
B. U.S. Environmental Protection Agency (EPA) Section 3 Stamped-Accepted label for Closer SC (Sequoia).
C. Thomas and Legard. *Lygus Management Project, 2011 Insecticide Resistance Bioassays*. 2011.
D. Joseph and Bolda. *2016 Insecticide Efficacy Trial for Lygus Bug control in Central Coast Strawberry*. September 2, 2016.
E. Zalom and Thompson. Lygus: *Insecticide Control, 2011*. 2011.
F. Omer, Amir. *Pest and Disease Protection Evaluation Memorandum*. California Department of Pesticide Regulation. November 01, 2013.
G. Brian, Bret. Letter of Support. Dow AgroSciences LLC. October 4, 2017.
H. Summary of Pesticide Use Report 2015. Department of Pesticide Regulation.
I. Bolda, Mark. Letter of Support. May 4, 2018.

REFERENCES

Thomas, H. 2014. 2014 Lygus and Mite Management Program. California Strawberry Commission. http://www.calstrawberry.com/Portals/2/Reports/Research%20Reports/Annual%20Production%20Research%20Reports/Annual%20Production%20Research%20Reports%202014/Thomas_2014%20Lygus_Mite_Report_2014-15.pdf?ver=2018-03-01-090638-640

Dara, S. 2015. *Role of lygus bug and other factors in strawberry fruit.* Strawberries and Vegetables. eJournal on production and pest management practices for strawberries and vegetables. November 25, 2015. http://ucanr.edu/blogs/blogcore/postdetail.cfm?postnum=19630

UC IPM Website: http://ipm.ucanr.edu/PMG/r734300111.html